

CLAIMS

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1. (cancelled)

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2. (cancelled)

3. (amended) A video display apparatus comprising:
a horizontal deflection circuit for deflecting an
electron beam back and forth in the horizontal direction to
10 form forward and backward scanning lines in the horizontal
direction on a screen;

a vertical deflection circuit for deflecting said
electron beam in the vertical direction; and

a vertical velocity modulation circuit for modulating
15 the scanning speed in the vertical direction of an electron
beam for successively forming scanning lines in the
horizontal direction on a screen, wherein

said vertical velocity modulation circuit comprises

a parallel scanning circuit for outputting a parallel
20 scanning signal for making the forward and backward scanning
lines formed by said horizontal deflection circuit parallel,

a movement control circuit for producing a movement
control signal for controlling the movement in the vertical
direction of the scanning lines such that a part of the
25 scanning line having a luminance which is not less than a

predetermined value in a luminance change portion in the vertical direction on the basis of a luminance signal moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value;

5 a synthesizing circuit for synthesizing the parallel scanning signal outputted by said parallel scanning circuit and the movement control signal produced by said movement control circuit, and

10 a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of a signal synthesized by said synthesizing circuit.

15 4. The video display apparatus according to claim 3, wherein

 said movement control circuit comprises

 a change portion detection circuit for detecting a luminance change portion in the vertical direction on the basis of the luminance signal,

20 a movement distance output circuit for outputting as said movement control signal the distance of movement of the scanning line on the screen in the vertical direction in the

luminance change portion detected by said change portion detection circuit on the basis of the luminance signal, and a time axis reversion circuit for reversing the time axis of the movement control signal outputted by said movement distance output circuit in backward scanning by said horizontal deflection circuit.

5. The video display apparatus according to claim 3, wherein

10 said vertical velocity modulation circuit further comprises

a clamping circuit for clamping the movement control signal produced by said movement control circuit to a predetermined potential at predetermined timing.

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6. The video display apparatus according to claim 3, wherein

said vertical velocity modulation circuit further comprises

20 an amplifier for amplifying the signal synthesized by said synthesizing circuit, and

a gain control circuit for controlling the gain of said amplifier.

25 7. The video display apparatus according to claim 6,

83/1

wherein said gain control circuit controls the gain of said amplifier on the basis of the number of the scanning lines formed on the screen by said horizontal deflection circuit.

5 8. The video display apparatus according to claim 6, wherein said gain control circuit controls the gain of said amplifier depending on the positions of the scanning lines formed on the screen by said horizontal deflection circuit.

10 9. (amended) A video display apparatus comprising:
 a horizontal deflection circuit for deflecting an electron beam in the horizontal direction to form scanning lines in the horizontal direction on a screen;

 a vertical deflection circuit for deflecting said
15 electron beam in the vertical direction; and

 a vertical velocity modulation circuit for modulating the scanning speed in the vertical direction of an electron beam for successively forming scanning lines in the horizontal direction on a screen, wherein

20 said vertical velocity modulation circuit comprises
 a movement distance output circuit for outputting the distance of movement on the screen of a part of the scanning line to be an object as the movement control signal on the basis of the difference between the luminance of a part of
25 the scanning line a predetermined number of horizontal

83/2

scanning periods ahead of and the luminance of a part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be the object and the level of the luminance of the part of the scanning line to be the object such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value, and

a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of the movement control signal outputted from said movement distance output circuit.

10. The video display apparatus according to claim 9, wherein

said movement distance output circuit comprises a difference calculation circuit for calculating the difference between the luminance of the part of the scanning line the predetermined number of horizontal scanning periods ahead of and the luminance of the part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be the object.

a first signal output circuit for outputting a first movement distance signal on the basis of an output signal of said difference calculation circuit,

5 a second signal output circuit for outputting a second movement distance signal on the basis of the luminance of the part of the scanning line to be the object, and

a multiplication circuit for multiplying the first movement distance signal outputted from said first signal output circuit and the second movement distance signal
10 outputted from said second signal output circuit together, and outputting the result of the multiplication as said movement control signal.

11. The video display apparatus according to claim 10,
wherein

said first signal output circuit sets the value of said
first movement distance signal to zero when the value of the
5 output signal of said difference calculation circuit is
smaller than a predetermined value, and

said second signal output circuit sets the value of said
second movement distance signal to zero when the luminance
of the part of said scanning line to be the object is smaller
10 than the predetermined value.

12. The video display apparatus according to claim 9,
wherein the scanning line said predetermined number of
horizontal scanning periods ahead of the part of the scanning
15 line to be the object is the scanning line two horizontal
scanning periods ahead of the part of the scanning line to
be the object, and the scanning line said predetermined
number of horizontal scanning periods behind the part of the
scanning line to be the object is the scanning line two
20 horizontal scanning periods behind the part of the scanning
line to be the object.

13. The video display apparatus according to claim 9,
wherein the scanning line said predetermined number of
25 horizontal scanning periods ahead of the part of the scanning

line to be the object is the scanning line one horizontal scanning period ahead of the part of the scanning line to be the object, and the scanning line said predetermined number of horizontal scanning periods behind the part of the scanning line to be the object is the scanning line one horizontal scanning period behind the part of the scanning line to be the object.

14. The video display apparatus according to claim 9,
10 wherein

said vertical velocity modulation circuit further comprises

a movement distance limitation circuit for limiting the distance of movement on the screen of the part of the scanning line such that the positions of the adjacent scanning lines are not replaced with each other by the movement of the part of the scanning line.

15. The video display apparatus according to claim 14,
20 wherein

said movement distance limitation circuit limits the movement control signal outputted from said movement distance output circuit to half when the luminance of the part of the scanning line to be the object and the luminance of the part of the scanning line two horizontal scanning periods

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87

behind the part of the scanning line to be the object are not less than the predetermined value, and the luminance of the part of the scanning line two horizontal scanning periods ahead of, the luminance of the part of the scanning line three horizontal scanning periods ahead of, and the luminance of the part of the scanning line three horizontal scanning periods behind the part of said scanning line to be the object are less than the predetermined value, or when the luminance of the part of the scanning line to be the object and the luminance of the part of the scanning line two horizontal scanning periods ahead of the part of said scanning line to be the object are not less than the predetermined value, and the luminance of the part of the scanning line two horizontal scanning periods behind, the luminance of the part of the scanning line three horizontal scanning periods behind, and the luminance of the part of the scanning line three horizontal scanning periods ahead of the part of said scanning line to be the object are less than the predetermined value.

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16. (amended) A video display apparatus comprising:
a horizontal deflection circuit for deflecting an electron beam in the horizontal direction to form scanning lines in the horizontal direction on a screen;

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a vertical deflection circuit for deflecting said

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88/1

electron beam in the vertical direction;

a vertical velocity modulation circuit for modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value,

a cathode ray tube; and

10 an electron gun provided in said cathode ray tube and having a metal case,

said vertical velocity modulation circuit comprising a movement control circuit for producing a movement control signal for controlling the movement in the vertical direction of the scanning lines on the basis of the luminance signal, and

a vertical velocity modulation coil disposed in a position departing from the periphery of said metal case of said electron gun and around said cathode ray tube for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of said movement control signal produced by said movement control circuit.

25 17. The video display apparatus according to claim 16,

88/2

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further comprising a deflection yoke disposed in the position departing from the periphery of said metal case of said electron gun and around said cathode ray tube, and constituting said horizontal deflection circuit and said
5 vertical deflection circuit,

said vertical velocity modulation coil being arranged inside said deflection yoke.

18. (amended) A video display apparatus comprising:
10 a horizontal deflection circuit for deflecting an electron beam in the horizontal direction to form scanning lines in the horizontal direction on a screen;
a vertical deflection circuit for deflecting said electron beam in the vertical direction; and
15 a vertical velocity modulation circuit for modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart
20 from a part of the adjacent scanning line having a lower luminance than said predetermined value, wherein
said vertical velocity modulation circuit comprises

a movement control circuit for producing the movement control signal for controlling the movement in the vertical direction of the scanning lines on the basis of the luminance
5 signal,

a frequency domain emphasis circuit for emphasizing a predetermined frequency domain of said movement control signal produced by said movement control circuit, and

a vertical velocity modulation coil for generating a
10 magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of said movement control signal emphasized by said frequency domain emphasis circuit.

15 19. The video display apparatus according to claim 18, wherein

said frequency domain emphasis circuit comprises an extraction circuit for extracting said predetermined frequency domain of said movement control
20 signal produced by said movement control circuit, and

an adder for adding said movement control signal produced by said movement control circuit and the signal in said frequency domain extracted by said extraction circuit together.

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90

20. (cancelled)

21. (amended) A vertical velocity modulation apparatus for modulating the scanning speed in the vertical direction of an electron beam for successively forming scanning lines in the horizontal direction on a screen, comprising:

a movement control circuit for producing a movement control signal for controlling the movement in the vertical direction of the scanning lines such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction on the basis of a luminance signal moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value; and

a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of the movement control signal produced by said movement control circuit;

a parallel scanning circuit for outputting a parallel scanning signal for making forward and backward scanning lines formed on the screen by deflecting the electron beam back and forth parallel; and

a synthesizing circuit for synthesizing the movement control signal produced by said movement control circuit and

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91

the parallel scanning signal outputted by said parallel scanning circuit,

said vertical velocity modulation coil generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of a signal synthesized by said synthesizing circuit.

22. (amended) A vertical velocity modulation apparatus for modulating the scanning speed in the vertical direction of an electron beam for successively forming scanning lines in the horizontal direction on a screen, comprising:

a movement control circuit for producing a movement control signal for controlling the movement in the vertical direction of the scanning lines such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction on the basis of a luminance signal moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value; and

a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of the movement control signal produced by said movement control circuit, wherein

said movement control circuit outputs the distance of

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92

movement on the screen of a part of the scanning line to be an object as said movement control signal on the basis of the difference between the luminance of a part of the scanning line a predetermined number of horizontal scanning periods ahead of and the luminance of a part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be the object and the level of the luminance of the part of the scanning line to be the object.

23. (amended) A vertical velocity modulation apparatus for modulating the scanning speed in the vertical direction of an electron beam for successively forming scanning lines in the horizontal direction on a screen, comprising:

a movement control circuit for producing a movement control signal for controlling the movement in the vertical direction of the scanning lines such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction on the basis of a luminance signal moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value;

a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of the

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PCT CHAPTER II
MD -D92

93

movement control signal produced by said movement control circuit; and

a frequency domain emphasis circuit for emphasizing a predetermined frequency domain of said movement control
5 signal produced by said movement control circuit.

24. The vertical velocity modulation apparatus according to claim 23, wherein

said frequency domain emphasis circuit comprises
10 an extraction circuit for extracting said predetermined frequency domain of said movement control signal produced by said movement control circuit, and
an adder for adding said movement control signal produced by said movement control circuit and the signal in
15 said frequency domain extracted by said extraction circuit.

25. (cancelled)

26. (cancelled)

20 27. (amended) A video display method comprising the steps of:

deflecting an electron beam back and forth in the horizontal direction and the vertical direction, to
25 successively form forward and backward scanning lines in the

PCT CHAPTER II
MD D9 2

horizontal direction on a screen; and

modulating the scanning speed in the vertical direction of the electron beam for successively forming scanning lines in the horizontal direction on a screen, wherein

5 the step of modulating said scanning speed comprises the steps of

outputting a parallel scanning signal for making the forward and backward scanning lines parallel,

producing a movement control signal for controlling the
10 movement in the vertical direction of the scanning lines such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction on the basis of a luminance signal moves farther apart from a part of the adjacent
15 scanning line having a lower luminance than said predetermined value;

synthesizing said parallel scanning signal and said movement control signal, and

generating a magnetic field for modulating the scanning
20 speed in the vertical direction of the electron beam on the basis of a synthesized signal.

28. The video display method according to claim 27, wherein

25 the step of producing said movement control signal

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95/1

comprises the steps of

detecting the luminance change portion in the vertical direction on the basis of the luminance signal,

outputting the distance of movement of the scanning line
5 on the screen in the vertical direction in said luminance change portion as said movement control signal on the basis of the luminance signal, and

reversing the time axis of said movement control signal in said backward scanning.

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29. The video display method according to claim 27, wherein

the step of modulating said scanning speed comprises the step of

15 clamping said movement control signal to a predetermined potential at predetermined timing.

30. (amended) A video display method comprising the steps of:

20 deflecting an electron beam in the horizontal direction and the vertical direction, to successively form scanning lines in the horizontal direction on a screen; and

modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line
25 having a luminance which is not less than a predetermined

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95/2

value in a luminance change portion in the vertical direction moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value, wherein

5 the step of modulating said scanning speed comprises the step of

setting the distance of movement on the screen of the part of said scanning line to be the object on the basis of the difference between the luminance of the part of the
10 scanning line the predetermined number of horizontal scanning periods ahead of and the luminance of the part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be the object and the level of the luminance of the part of the
15 scanning line to be the object.

31. (amended) A video display method comprising the steps of:

deflecting an electron beam in the horizontal direction
20 and the vertical direction, to successively form scanning lines in the horizontal direction on a screen; and

modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line having a luminance which is not less than a predetermined
25 value in a luminance change portion in the vertical direction

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95/3

moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value, wherein

the step of modulating said scanning speed comprises
5 the steps of

producing a movement control signal for controlling the movement in the vertical direction of the scanning lines on the basis of the luminance signal,

emphasizing a predetermined frequency domain of said
10 movement control signal, and

generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of said movement control signal.